

Appendix D: Emissions Standards

Summary of Federal and California Exhaust Emissions Standards for CNG, LPG, Gasoline, and Diesel¹

This table summarizes exhaust emissions standards. Although it does not cover all the exhaust standards, it does provide information on those that we have mentioned frequently. See Tables 3, 4, and 11 in the body of the guide for sources of information for other details on exhaust, evaporative, and other emissions standards. See Appendix A for an explanation of all abbreviations.

Vehicle			Emissions Category ^a	Exhaust Emissions Standards, in grams per mile																		
				50,000 Miles						100,000 Miles				120,000 Miles								
GVWR in Pounds	Weight in Pounds	Type		THC ^b	(NMHC) ^c NMOG ^d	CO	NO _x	HCHO	PM ^e	(NMHC) ^c NMOG ^d	CO	NO _x	HCHO	PM ^e	THC ^b	(NMHC) ^c NMOG ^d	CO	NO _x	HCHO	PM ^e		
		Light-Duty Vehicle	Fed tier 0	0.41	(0.34) ^f	3.4	1.0		0.20													
			Fed tier 1	0.41	(0.25)	3.4	0.4		0.08	(0.31)	4.2	0.6		0.10								
			Fed LEV		0.075	3.4	0.2	0.015		0.090	4.2	0.3	0.018	0.08								
			Fed ILEV		0.075	3.4	0.2	0.015		0.090	4.2	0.3	0.018	0.08								
			Fed ULEV		0.040	1.7	0.2	0.008		0.055	2.1	0.3	0.011	0.04								
		Passenger Car	Ca tier 0		(0.39)	7.0	0.4		0.08													
			CA tier 1		(0.25)	3.4	0.4		0.08	(0.31)	4.2	0.6										
			CA TLEV		0.125	3.4	0.4	0.015		0.156	4.2	0.6	0.018	0.08								
			CA LEV		0.075	3.4	0.2	0.015		0.090	4.2	0.3	0.018	0.08								
			CA ULEV		0.040	1.7	0.2	0.008		0.055	2.1	0.3	0.011	0.04								
0-6,000	0-3,750 LVW	Light-Duty Truck 1	Fed tier 0											0.80	(0.67) ^f	10	1.2			0.26		
			Fed tier 1		(0.25)	3.4	0.4		0.08	(0.31)	4.2	0.6		0.10	0.80							
			Fed LEV		0.075	3.4	0.2	0.015		0.090	4.2	0.3	0.018	0.08								
			Fed ILEV		0.075	3.4	0.2	0.015		0.090	4.2	0.3	0.018	0.08								
			Fed ULEV		0.040	1.7	0.2	0.008		0.055	2.1	0.3	0.011	0.04				2.1		0.055		
			CA tier 0		(0.39)	9.0	0.4		0.08													
			CA tier 1		(0.25)	3.4	0.4		0.08	(0.31)	4.2	0.6										
			CA TLEV		0.125	3.4	0.4	0.015		0.156	4.2	0.6	0.018	0.08								
			CA LEV		0.075	3.4	0.2	0.015		0.090	4.2	0.3	0.018	0.08								
	CA ULEV		0.04	1.7	0.2	0.008		0.055	2.1	0.3	0.011	0.04										
	3751-5750 LVW	Light-Duty Truck 2	Fed tier 0												0.80	(0.67) ^f	10	1.7			0.13	
			Fed tier 1		(0.32)	4.4	0.7		0.08	(0.40)	5.5	0.97		0.10	0.80							
			Fed LEV		0.100	4.4	0.4	0.018		0.130	5.5	0.5	0.023	0.08								
			Fed ILEV		0.100	4.4	0.4	0.018		0.130	5.5	0.5	0.023	0.08								
			Fed ULEV		0.050	2.2	0.4	0.009		0.070	2.8	0.5	0.013	0.04								
			CA tier 0		(0.50)	9.0	1.0		0.08													
			CA tier 1		(0.32)	4.4	0.7		0.08	(0.40)	5.5	0.97										
			CA TLEV		0.160	4.4	0.7	0.018		0.200	5.5	0.9	0.023	0.10								
CA LEV				0.100	4.4	0.4	0.018		0.130	5.5	0.5	0.023	0.10									
CA ULEV		0.050	2.2	0.4	0.009		0.070	2.8	0.5	0.013	0.05											

Vehicle			Emissions Category ^a	Exhaust Emissions Standards, in grams per mile																
				50,000 Miles						100,000 Miles				120,000 Miles						
GVWR in Pounds	Weight in Pounds	Type		THC ^b	(NMHC) ^c NMOG ^d	CO	NO _x	HCHO	PM ^e	(NMHC) ^c NMOG ^d	CO	NO _x	HCHO	PM ^e	THC ^b	(NMHC) ^c NMOG ^d	CO	NO _x	HCHO	PM ^e
6,001–8,500	0–3,750 LVW	Heavy Light-Duty Truck	Fed tier 0											0.80	(0.67) ^f	10	1.2		0.26	
		Medium-Duty Vehicle	CA tier 0		(0.39)	9.0	0.4		0.08											
	3,751–5,750 LVW	Heavy Light-Duty Truck	Fed tier 0												0.80	(0.67) ^f	10	1.7		0.13
		Medium-Duty Vehicle	CA tier 0		(0.50)	9.0	1.0		0.08											
	5,751–8,500 LVW	Heavy Light-Duty Truck	Fed tier 0												0.80	(0.67) ^f	10	1.7		0.13
		Medium-Duty Vehicle	CA tier 0		(0.60)	9.0	1.5		0.08											
	0–3,750 ALVW	Heavy Light-Duty Truck	Fed LEV		0.125	3.4	0.4	0.015								0.180	5.0	0.6	0.022	0.08
			Fed ILEV		0.125	3.4	0.2	0.015								0.180	5.0	0.3	0.022	0.08
			Fed ULEV		0.075	1.7	0.2	0.008								0.107	2.5	0.3	0.012	0.04
		Medium-Duty Vehicle 1	CA tier 1		(0.25)	3.4	0.4									(0.36)	5.0	0.55		0.08
			CA LEV		0.125	3.4	0.4	0.015								0.180	5.0	0.6	0.022	0.08
			CA ULEV		0.075	1.7	0.2	0.008								0.107	2.5	0.3	0.012	0.04
	3,751–5,750 ALVW	Light-Duty Truck 3	Fed tier 1		(0.32)	4.4	0.7								0.80	(0.46)	6.4	0.98		0.10
			Fed LEV		0.160	4.4	0.7	0.018								0.230	6.4	1.0	0.027	0.10
			Fed ILEV		0.160	4.4	0.4	0.018								0.230	6.4	0.5	0.027	0.10
			Fed ULEV		0.100	2.2	0.4	0.009								0.143	3.2	0.5	0.013	0.05
		Medium-Duty Vehicle 2	CA tier 1		(0.32)	4.4	0.7									(0.46)	6.4	0.98		0.10
			CA LEV		0.160	4.4	0.4 ^g	0.018								0.230	6.4	0.6 ^h	0.027	0.10
			CA ULEV		0.100	4.4	0.4	0.009								0.143	6.4	0.6	0.013	0.05
			CA SULEV		0.050	2.2	0.2	0.004								0.072	3.2	0.3	0.006	0.05
	5,751–8,500 ALVW	Light-Duty Truck 4	Fed tier 1		(0.39)	5.0	1.1								0.80	(0.56)	7.3	1.53		0.12
			Fed LEV		0.195	5.0	1.1	0.022								0.280	7.3	1.5	0.032	0.12
			Fed ILEV		0.195	5.0	0.6	0.022								0.280	7.3	0.8	0.032	0.12
			Fed ULEV		0.117	2.5	0.6	0.011								0.167	3.7	0.8	0.016	0.06
Medium-Duty Vehicle 3		CA tier 1		(0.39)	5.0	1.1									(0.56)	7.3	1.53		0.12	
		CA LEV		0.195	5.0	0.6 ⁱ	0.022								0.280	7.3	0.9 ^j	0.032	0.12	
		CA ULEV		0.117	5.0	0.6	0.011								0.167	7.3	0.9	0.016	0.06	
		CA SULEV		0.059	2.5	0.3	0.006								0.084	3.7	0.45	0.008	0.06	
8,501–14,000	8,501–10,000 ALVW	Medium-Duty Vehicle 4	CA tier 1		(0.46)	5.5	1.3								(0.66)	8.1	1.81		0.12	
			CA LEV		0.230	5.5	0.7 ^k	0.028							0.330	8.1	1.0 ^l	0.040	0.12	
			CA ULEV		0.138	5.5	0.7	0.014								0.197	8.1	1.0	0.021	0.06
			CA SULEV		0.069	2.8	0.35	0.007								0.100	4.1	0.5	0.010	0.06
	10,001–14,000 ALVW	Medium-Duty Vehicle 5	CA tier 1		(0.60)	7.0	2.0									(0.86)	10.3	2.77		0.12
			CA LEV		0.300	7.0	1.0 ^m	0.036								0.430	10.3	1.5 ⁿ	0.052	0.12
			CA ULEV		0.180	7.0	1.0	0.018								0.257	10.3	1.5	0.026	0.06
			CA SULEV		0.090	3.5	0.5	0.090								0.130	5.2	0.7	0.013	0.06

Vehicle			Emissions Category ^a	Exhaust Emissions Standards, in grams per mile															
				50,000 Miles					100,000 Miles					120,000 Miles					
				THC ^b	(NMHC) ^c NMOG ^d	CO	NO _x	HCHO	PM ^e	(NMHC) ^c NMOG ^d	CO	NO _x	HCHO	PM ^e	THC ^b	(NMHC) ^c NMOG ^d	CO	NO _x	HCHO
GVWR in Pounds	Weight in Pounds	Type																	
8,501–14,000		Medium-Duty Vehicle (OPT) ^o	CA tier 1												(3.9) ^p	14.4			0.10
			CA LEV												(3.5) ^p	14.4		0.050	0.10
		8,501–14,000 GVWR	CA ULEV												(2.5) ^p	14.4 ^q		0.050 ^r	0.05
8,501–14,000		Heavy-Duty Otto-Cycle Engine ^{s,t}	Fed											1.1	(0.9) ^f	14.4	4.0 ^u		
Greater Than 14,000		Heavy-Duty Otto-Cycle Engine ^{s,t}	Fed & CA											1.9	(1.7) ^v	37.1	4.0 ^w		
Greater Than 8,501 ^x		Heavy-Duty Diesel Engine ^{s,y}	Fed & CA											1.3	(1.2) ^v	15.5	4.0 ^w		0.10
		Heavy-Duty Otto-Cycle and Diesel Engine ^{s,t,y}	Fed LEV											1.3 ^z	(3.8) ^p	15.5 ^{aa}	4.0 ^u		0.10
			Fed ILEV											1.3 ^z	(2.5) ^p	14.4	4.0 ^u	0.05	0.10
			Fed ULEV											1.3 ^z	(2.5) ^p	7.2	4.0 ^u	0.025	0.05

¹ Diesel standards are provided for HDEs only.

^a “Fed” means federal; “CA” means California

^b CNG is exempt from THC standard.

^c NMHC standards are within parentheses.

^d Dual-fuel PCs, LDVs, LDTs, and MDVs that are a part of federal LEV and ULEV and California TLEV, LEV, ULEV, & SULEV emission categories may have different NMOG standards than those listed in this table. Gasoline is required to meet the standards for the emissions category for the original MY and a new gasoline NMOG standard. Refer to the next table for the NMOG standards if different than above.

^e Shaded PM standards in this column refer to diesel only standard.

^f NMHC standard applies to CNG only.

^g Prior to MY 1998, the standard is 0.7.

^h Prior to MY 1998, the standard is 1.0.

ⁱ Prior to MY 1998, the standard is 1.1.

^j Prior to MY 1998, the standard is 1.5.

^k Prior to MY 1998, the standard is 1.3.

^l Prior to MY 1998, the standard is 1.8.

^m Prior to MY 1998, the standard is 2.0.

ⁿ Prior to MY 1998, the standard is 2.8.

^o Optional standard for incomplete medium-duty vehicles of 8,501–14,000 lb GVWR. Emissions standards are in grams per brake horsepower-hour.

^p Combined NMHC and NO_x standard.

^q 14.4 grams per brake horsepower-hour for Otto-Cycle and 7.2 for diesel-cycle.

^r 0.050 applies to Otto-Cycle engines. For diesel-cycle engines, the standard is 0.025.

^s Standards are in grams per brake horsepower-hour.

^t Useful life is eight years or 110,000 miles for heavy-duty Otto-Cycle engines.

^u Prior to MY 1998, the standard is 5.0. CNG remains at 5.0 for MY 1998. In MY 1998, the year portion of useful life becomes ten years.

^v Optional for California. For federal, applies to CNG only.

^w Prior to MY 1998, the standard is 5.0. In MY 1998, CNG remains at 5.0 for federal certification and changes to 4.0 for California certification. In MY 1998 the year portion of useful life becomes ten years.

^x California vehicle weight category is greater than 14,000 lb GVWR.

^y Useful life is eight years or 110,000 miles for LHDDE, 185,000 miles for MHDDE, and 290,000 miles for HHDDE.

^z 1.3 grams per brake horsepower-hour for diesel-cycle, 1.1 for Otto-Cycle engines in vehicles weighing 14,000 lb or less GVWR, and 1.9 for Otto-Cycle engines in vehicles weighing more than 14,000 lb GVWR.

^{aa} 15.5 grams per brake horsepower-hour for diesel-cycle, 14.4 for Otto-Cycle engines in vehicles weighing 14,000 lb or less GVWR, and 37.1 for Otto-Cycle engines in vehicles weighing more than 14,000 lb.

Appendix D

Appendix D - Emission Standards (concluded):

Additional NMOG Standards^a for Dual-Fuel Vehicles, in grams per mile

In order to certify a dual-fuel vehicle to a TLEV, LEV, ULEV, or SULEV emissions standard, emissions on both CNG and LPG must comply with the standards specified in the previous table with the exception of those NMOG standards listed here. Gasoline emissions are not to exceed the standards applicable to the original model year of the vehicle, and the NMOG standards given here. See Appendix A for an explanation of all abbreviations.

Vehicle Type	Emissions Category ^b	NMOG Standards, in grams per mile			
		50,000 Miles		100,000 Miles	
		CNG or LPG	Gasoline	CNG or LPG	Gasoline
Light-Duty Vehicle, Passenger Car, Light-Duty Truck 1 (0–3750 lb LVW)	Fed All	0.125	0.25	0.156	0.31
	CA TLEV		0.25		0.31
	CA LEV		0.125		0.156
	CA ULEV		0.075		0.090
Light-Duty Truck 2 (3751–5750 lb LVW)	Fed All	0.160	0.32	0.200	0.40
	CA TLEV		0.32		0.40
	CA LEV		0.160		0.200
	CA ULEV		0.100		0.130
Heavy Light-Duty Truck, Medium-Duty Vehicle 1 (0–3750 lb ALVW)	Fed All	0.125	0.25	0.180	0.36
	CA LEV		0.25		0.36
	CA ULEV		0.125		0.180
Light-Duty Truck 3, Medium-Duty Vehicle 2 (3751–5750 lb ALVW)	Fed All	0.160	0.32	0.230	0.46
	CA LEV		0.32		0.46
	CA ULEV		0.160		0.230
	CA SULEV		0.100		0.143
Light-Duty Truck 4, Medium-Duty Vehicle 3 (5751–8500 lb ALVW)	Fed All	0.195	0.39	0.280	0.56
	CA LEV		0.39		0.56
	CA ULEV		0.195		0.280
	CA SULEV		0.117		0.167
Medium-Duty Vehicle 4 (8501–10,000 lb ALVW)	CA LEV		0.46		0.66
	CA ULEV		0.230		0.330
	CA SULEV		0.138		0.197
Medium-Duty Vehicle 5 (10,001–14,000 lb ALVW)	CA LEV		0.60		0.86
	CA ULEV		0.300		0.430
	CA SULEV		0.180		0.257

^a Applies to federal CFV and California TLEV, LEV, ULEV, and SULEV emissions categories.

^b “Fed” means federal; “CA” means California